Work Order ID 55372

January 14, 2010 2:39:09 PM

Item ID: D350-748-241TRN **Accept** **Setup Start** **Stop**

Revision ID:

Item Name: Crosstube Turning Detail

Start Date: 1/14/10 **Start Qty:** 1.00 **Cust Item ID:**

Required Date: 1/21/10 **Req'd Qty:** 1.00 **Customer:**

Reference:

Run Start **Stop**

Approvals: **Process Plan:** M **Date:** 10-1-14 **Tooling:** _____ **Date:** _____

QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	**Revision Nbr**								
D350-748-241	Rev E								

100 — 0.00

Mori Seiki

MORI SEIKI CNC LATHE LARGE

Mori Seiki CNC Lathe Large

Memo 0.00

1-Fill tube with sand & install plugs on both ends as per Folio FA647
2-Turn first side as per Folio FA647
3- File transition lines smooth.

Q.M 10-02-10 (1)

110 — QC1- Inspect dimensions to dimension sheet — 0.00

QC

Quality Control

Memo 0.00

MB/Q.M (1x) MB 10-02-10

120 — 0.00

Mori Seiki

MORI SEIKI CNC LATHE LARGE

Mori Seiki CNC Lathe Large

Memo 0.00

1-Turn second side as per Folio FA647
2- File transition lines smooth.
3-Scribe part # as per Dwg D350-748-241

Batch#

Q.M 10-02-10 (8)

10/02/09

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Work Order ID 55372

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QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130	QC1- Inspect dimensions to dimension sheet	0.00							
QC	**Memo**	0.00	MP/any			(1K) 2		MP 10-02-10	
Quality Control									
140	QC8- Inspect parts - second check	0.00							
QC	**Memo**	0.00	S.P 10/02/17						
Quality Control									
150	Large Fab	0.00				1	—	— AW 10.2.16	
Crosstubes	**Memo**	0.00							
Crosstubes	Grind machining marks.								

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

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NOTE: Date & initial all entries

Work Order ID 55372

January 14, 2010 2:39:09 PM

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Run Start **Stop**

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160	Outsource process - Heat Treat	0.00				CL	10/5/11	1	
Outsource1	**Memo**	0.00							
Outsource process - Heat Treat	Issue P/O: 18619 Heat Treat to min 180 KSI As per Dwg D350-748-241 Sand Blast tube after Heat Treat Possibe Supplier: Vac Aero Ensure Certificate of Conformity is attached								
170	Receive & Inspect for Damage & Mat'l Certs	0.00					10/26	1	
Packaging	**Memo**	0.00							
Packaging	Ensure certificate of conformaty is attached								
180	QC6- Inspect dimensions to drawing	0.00							
QC	**Memo**	0.00							
Quality Control									

10/05/27

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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NOTE: Date & initial all entries

Work Order ID 55372

January 14, 2010 2:39:09 PM

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Run Start **Stop**

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
190	Packaging	0.00							
Packaging	**Memo**	0.00							
Packaging	Identify and stock in kanban rack Location: x-tubes								

10-5-27 (1)

200	QC21- Final Inspection - Work Order Release	0.00							
QC	**Memo**	0.00							
Quality Control									

10/05/28 MF 10-5-27

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

January 14, 2010 2:39:13 PM

Work Order ID: 55372

Parent Item: D350-748-241TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 1/14/10 **Required Date:** 1/21/10

Start Qty: 1.00 **Required Qty:** 1.00

Comments:
IPP Rev:A New Issue 08-03-06 DD verified by:ec
IPP Rev B Removed polish 08.04.02 EC verified by : DD
IPP Rev C Removed LPS-3 08.06.23 Ec verified by: DD

Component Item ID/	Replacement	Mfg/	Bin	Primary	Last	Route	Unit of	Qty on	Remaining	Qty	Date	Status
D6018-125		Manufactured	No			120	Each	54.0000	1.0000		10-02-10	

Crosstube Material

Warehouse / Location	Loc Qty	Loc Code	
Main Warehouse			
LG	54		
27472	6		
32913	48		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	55372
Description: Crosstube Assembly (AS350/355 High Aft)	Part Number:	D350-748-241
Inspection Dwg: D350-748-241 **Rev:** D		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

[X] First Article [ ] Prototype

Inspection Sheet Drawing Dimension		Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.244	✓			
	2.180	+0.005/-0.000	2.184	✓			
	2.180	+0.005/-0.000	2.185	✓			
	2.208	+0.005/-0.000	2.212	✓			
	2.234	+0.005/-0.000	2.237	✓			
	2.253	+0.005/-0.000	2.256	✓			
	2.272	+0.005/-0.000	2.277	✓			
	2.299	+0.005/-0.000	2.299	✓			
	0.063	+/-0.010	0.065	✓			
	4.26	+/-0.030	4.282	✓			
	R0.063	+/-0.010	R.0.063	✓			
	R0.50	+/-0.030	R0.50	✓			
SIDE B	2.240	+0.005/-0.000	2.240	✓			
	2.180	+0.005/-0.000	2.185	✓			
	2.180	+0.005/-0.000	2.185	✓			
	2.208	+0.005/-0.000	2.212	✓			
	2.234	+0.005/-0.000	2.236	✓			
	2.253	+0.005/-0.000	2.254	✓			
	2.272	+0.005/-0.000	2.277	✓			
	2.299	+0.005/-0.000	2.300	✓			
	0.063	+/-0.010	0.065	✓			
	4.26	+/-0.030	4.284	✓			
	R0.063	+/-0.010	R.0.063	✓			
	R0.50	+/-0.030	R.0.50	✓			
	122.70	+/-0.060	122.72	✓			

Measured by:	MB/DW	Audited by:	SF	Prototype Approval:	N/A
Date:	10-02-10	Date:	10/02/17	Date:	N/A

Rev	Date	Change		Revised by	Approved
A	07.01.17	New Issue	(P/O D350-748-201)	KJ/JLM	

Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6018-125	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

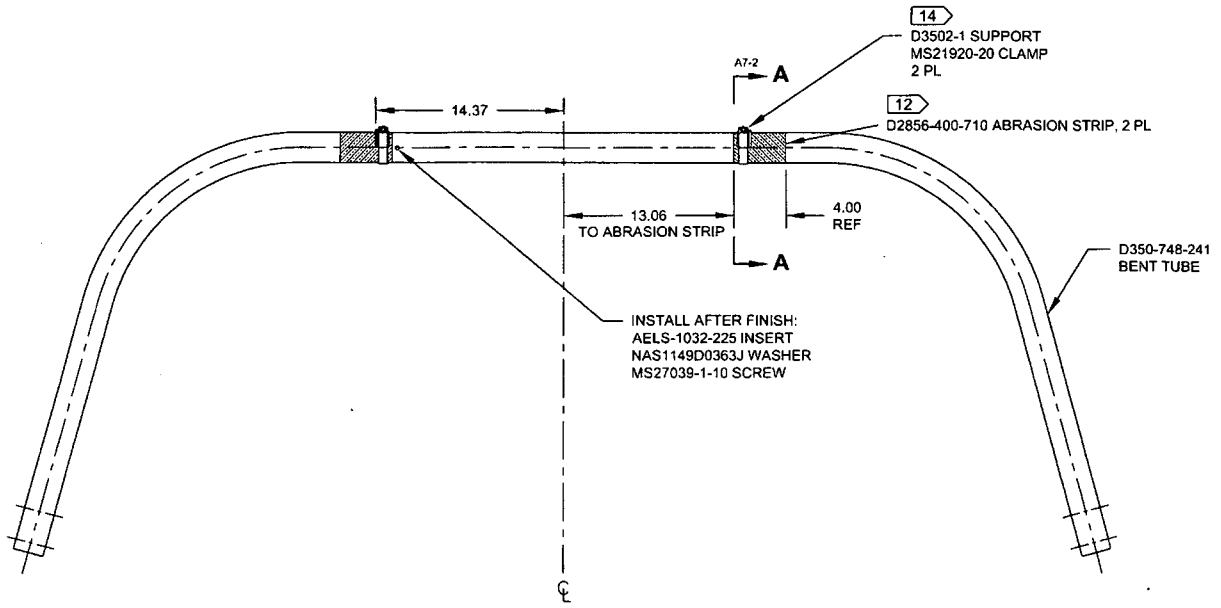
1) MATERIAL: MANUFACTURED FROM D6018-125
   FINISHED LENGTH = 122.700±0.06
2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
   CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
   PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
   PAINT OUTSIDE PER DART QSI 005 4.2
3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
4) UNITS: INCHES UNLESS OTHERWISE NOTED.
5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
6) IDENTIFICATION: SCRIBE DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
7) WEIGHT: 29.85 lbs
8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING.
12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 55372
10-1-14

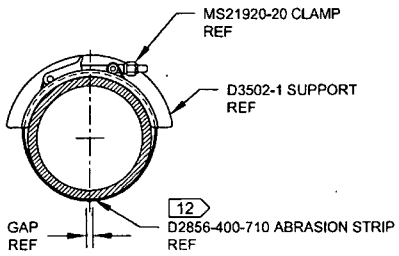
RELEASED
2009 -10- 29

REV.	DESCRIPTION	BY	DATE
E	REVISE GENERAL NOTES; UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31

DESIGN		DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA
DRAWN	RF	
CHECKED		DRAWING NO. REV. E
MFG. APPR.		D350-748-241 SHEET 1 OF 4
APPROVED		TITLE SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI AFT) NTS
DATE	09.09.30	



D350-748-241
ASSEMBLY DETAIL

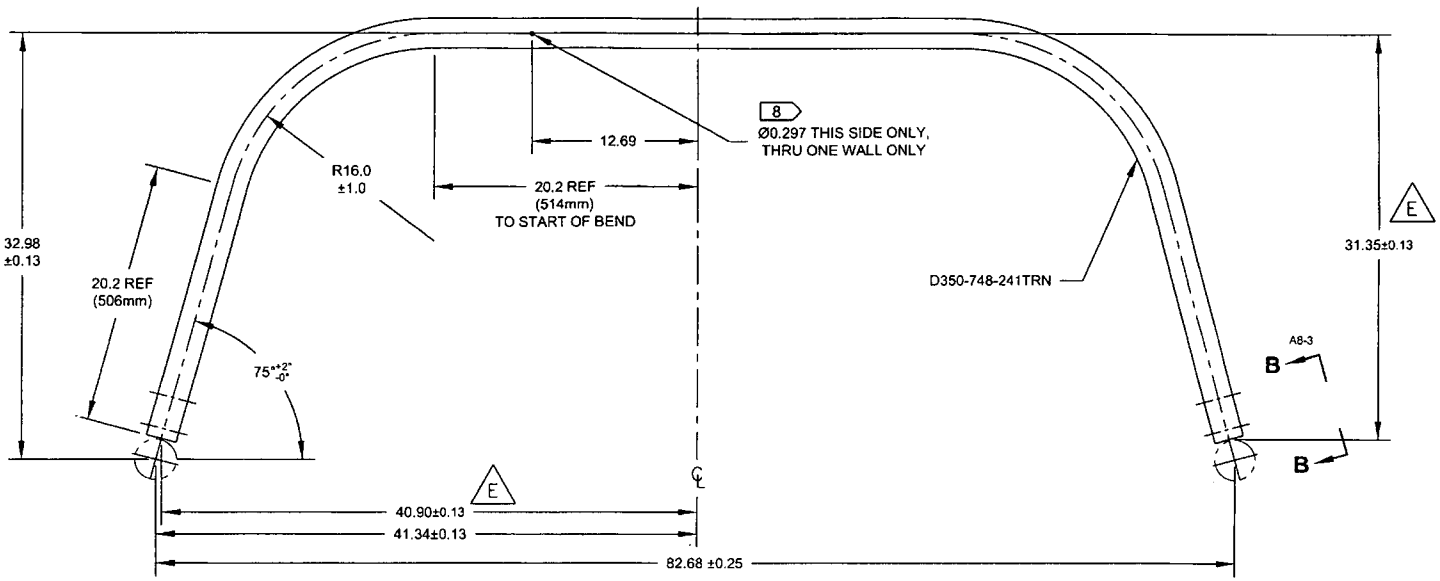


SECTION A-A D4-2
SCALE 4X

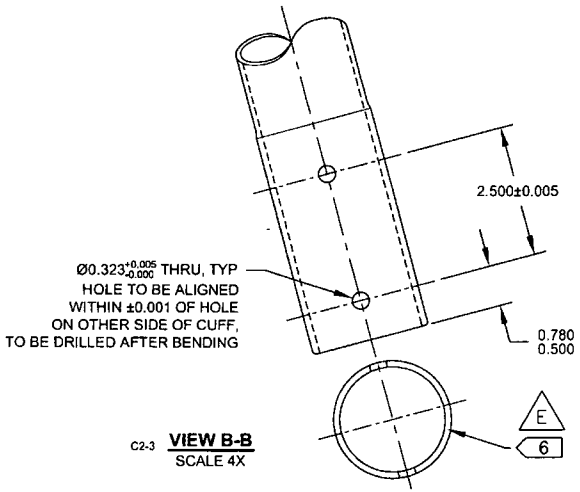
RELEASED
2009 -10- 29
MP

w/o 55372

DESIGN	RP	**DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA
DRAWN	RF	
CHECKED	RP	DRAWING NO. D350-748-241 REV. E
MFG. APPR.		SHEET 2 OF 4
APPROVED		TITLE CROSSTUBE (AS 350/355 HI AFT) SCALE NTS
DE APPR.		
DATE 09.09.30		



D350-748-241
BENDING AND DRILLING DETAIL 10

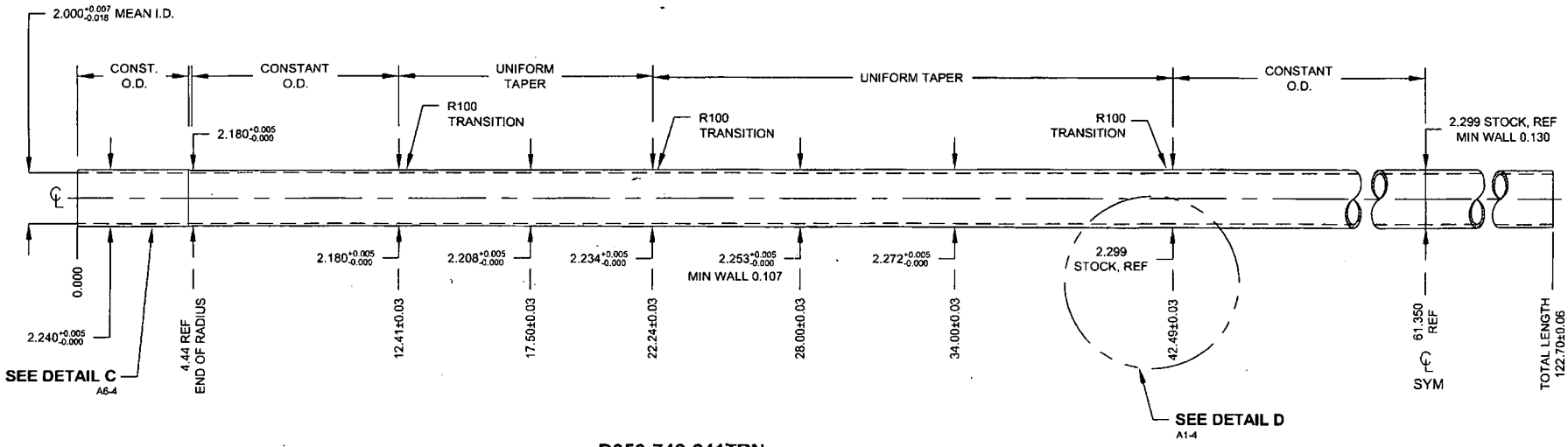


C2-3 **VIEW B-B**
SCALE 4X

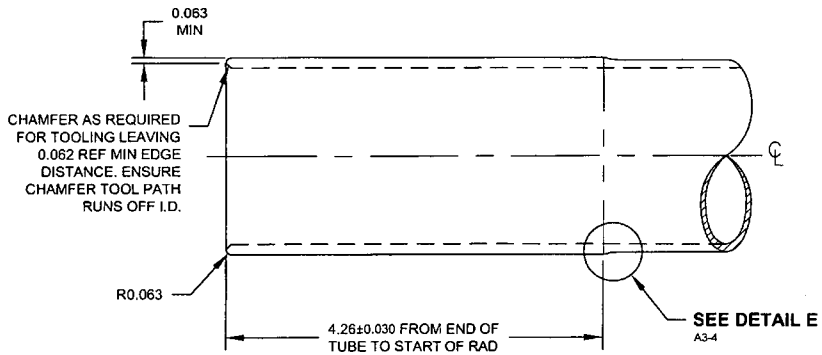
RELEASED
2009 -10- 29
MP

w/o 55372

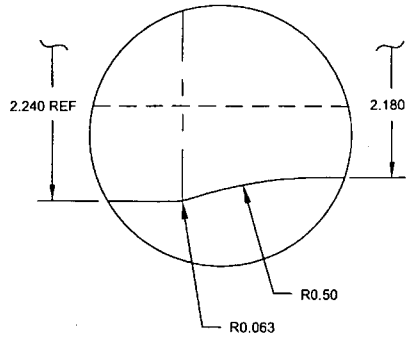
DESIGN	[illegible]	**DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA
DRAWN	RF	
CHECKED	[illegible]	DRAWING NO. D350-748-241 REV. E SHEET 3 OF 4
MFG. APPR.	[illegible]	
APPROVED	[illegible]	TITLE CROSSTUBE (AS 350/355 HI AFT) SCALE NTS
DE APPR.	[illegible]	
DATE	09.09.30	



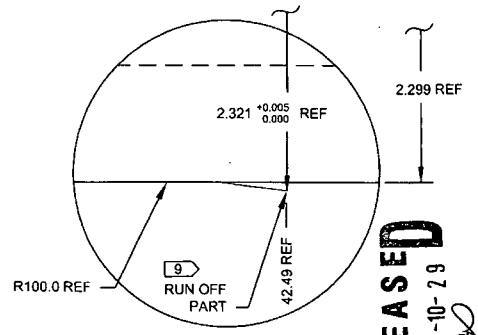
D350-748-241TRN TURNING DETAIL



DETAIL C: CROSSTUBE CUFF C8-4
SCALE 3X



DETAIL E: CUFF TRANSITION A5-4
NOT TO SCALE



DETAIL D: TAPER RUN-OFF C3-4
NOT TO SCALE

RELEASED 2009-10-29

w/o 55378

DESIGN		DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA
DRAWN	RF	
CHECKED		DRAWING NO. D350-748-241 REV. E SHEET 4 OF 4
MFG. APPR.		
APPROVED		TITLE CROSSTUBE (AS 350/355 HI AFT) SCALE NTS
DE APPR.		
DATE	09.09.30	

VAC AERO INTERNATIONAL INC.

RELEASE NOTE

GST No. : R105468102

OAK 119552-1

☒ HEAD OFFICE
1371 SPEERS ROAD, OAKVILLE, ONTARIO
CANADA L6L 2X5
TEL: (905) 827-4171 FAX: (905) 827-7489

☐ 2009 WYECROFT ROAD, UNIT B
OAKVILLE, ONTARIO
CANADA L6I 6J4
TEL: (905) 827-7377 FAX: (905) 827-1380

☐ QUEBEC DIVISION
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC
CANADA H4S 1C5
TEL: (514) 334-4240 FAX: (514) 334-6269

05/19/2010
MM / DD / YYYY

1DAR01

BILL TO: DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

K6A 1K7

SHIP TO : DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

K6A 1K7

DATE SHIPPED	SHIP VIA	F.O.B.
05/19/2010		ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
PO11869		NET 30 DAYS

PART No.	DESCRIPTION	UOM	QTY ORD	QTY SHPD	TEST RESULTS
D350-748	-141 TRN CROSSTUBE	EA	12	12	

Process Specifications: Procedure: 4353
HEAT TREATED TO 180 KSI MIN. PER AMS 2759-1E
100% HARDNESS CHECKED AS PER ASTM E-18
40/45 HRC
MATERIAL: ~~4130~~
SAND BLASTED AFTER HEAT TREAT

55294, 55295, 55296, 55297, 55298, 55299;
55300, 55301, 55372, 55373, 55374, 55375

100% HARDNESS TESTED
12 pcs.
42/43 HRC

V.A.I.O. TH. 25 Q.C.

I hereby certify that the material covered by this release note has been inspected and tested and conforms to all specifications relevant thereto in accordance with the conditions of the contract / or purchase order.

ON BEHALF OF VAC AERO INTERNATIONAL INC.

V.A.I.O. TH. 25 Q.C.

Authorized Q.C. Inspector

INTERTEK AS9100 • ISO 9001

MTI METAL TREATING INSTITUTE

Accredited Nadcap™ Heat Treating • Welding